(470316) 2007 OC10, (470309) 2007 JK43, and (19521) Chaos, results from stellar occultations.

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Introduction: Trans-Neptunian objects (TNOs) are primitive objects surviving from the early stages of the Solar System, remnants of the planet formation. TNOs are valuable witnesses of the early conditions of the planetary nebula, planetesimal formation, and dynamical processes that shaped the Solar System afterward.

A stellar occultation, when an object passes on front of a distant star, allow us to sample the object and surrounding down to sub-km resolution. Combining one or more occultations with dense and sparse cadence photometry can constrain the geometric albedo, size, shape, and spin axis of otherwise unresolved small Solar System bodies [1, 2, 3].

I will present unpublished stellar occultation measurements for three trans-Neptunian objects organized by our group. A stellar occultation by 470316 was observed in August 2022, providing five detections, although with partial coverage of the object. A stellar occultation by 470309 observed on 4th November 2022 resulted in two detections (Fig. 1). For 479316 and 470309 the occultation data provide constrains on the projected size,shape and orientation of the objects. Chaos had four occultations between 2020 and 2023, allowing us to model its tridimensional shape directly.

We do not know the rotation period for any of these TNOs, existing only an upper limit in the rotational light curve amplitude, putting additional constraints on its shape.

Dense time-series imaging with high photometric accuracy is needed for these targets to extract the most from the invaluable stellar occultation data.

I will present results on the size and shape of the three TNOs adopting a statistical approach developed to analyze stellar occultation under various complex conditions [2, 4].

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References: [1] Dias-Oliveira A. et al. (2017) AJ, 154, 1. [2] Leiva R. et al. (2017) AJ, 154, 4. [3] Ortiz J.L. et al. (2020) A&A 639. [4] Leiva R. et al. (2020) PSJ, 1, 2, 48. [5] Santos-Sanz P. et al. (2012) A&A, 541, A92.

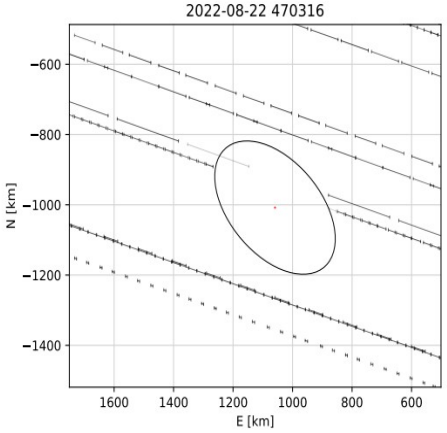

Fig 1. Occultation by 470316 on 22 Aug 2022. Each segmented line represents the time-series photometry from one site, with segment length given by the exposure time. The gaps in the center are the flux drops measured from two adjacent sites. A nominal elliptical model indicates an equivalent diameter of 230 km and a geometric albedo of about 10%, compatible with the geometric albedo derived from thermal measurements [5].